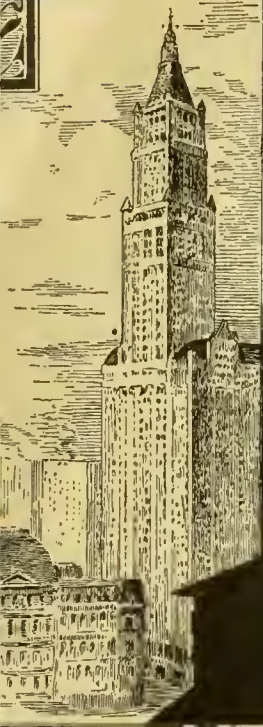


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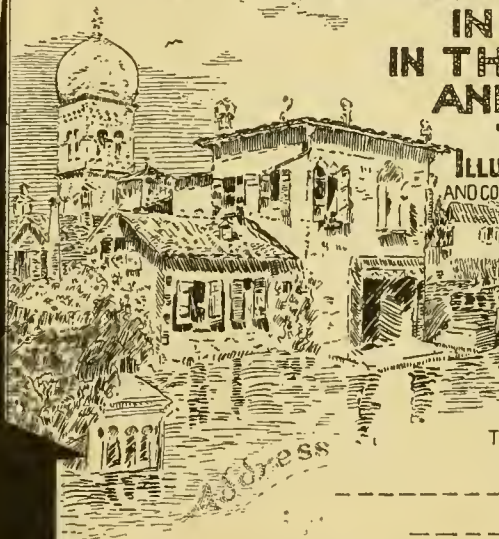
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CENSUS RECREATIONS

FACTS AND FIGURES

RELATIVE TO THE GROWTH AND RANK OF CITIES IN THE STATE IN THE COUNTRY AND THRU-OUT THE WORLD



ILLUSTRATED BY A MOST COMPLETE
AND COMPREHENSIVE CHART DISPLAY OF
TWO HUNDRED CITIES IN ORDER
OF POPULATION AND A DIAGRAM
BASED ON TIME-SCALE
MEASUREMENTS APPLYING
TO ANY OR ALL POPULATION
CENTERS-CITY-STATE-OR
NATIONAL

COMPILED AND DESIGNED BY
W. H. THOMPSON

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TIME-SCALE CHART. TWO HUNDRED LARGEST CITIES.

To complete this chart for your home city, or for the city, town, or village in which you are most interested, if the name does not appear in any of the following lists, write it on the blank space at the end and enter correct population and time figures in the proper columns. Then mark with pen or pencil on the large central dial in the diagram, and also on the proper one in the chain of dials above the time piece hands or pointers, setting them to show time noted in the table below.

The abbreviation m. in this chart stands for either thousands population, or minutes of time, and which is intended will, in every instance, be evident from the context. Sometimes it has a double significance and may be read both as thousands and minutes; thus, take the record of Cleveland, O.: "1900, 382 m., 6 h. 22 m.—6.22; 1910, 561 m., 9 h. 21 m.—9.21." This should be read, Cleveland, O., 1900—382 thousands, 382 minutes, 6 h. 22 m.; time, 6.22. In 1910, 561 thousands, 561 minutes, 9 h. 21 m.; time, 9.21.

Except for the three higher grade cities, New York, Chicago and Philadelphia, we do not need to distinguish the days as first, second, third, etc., or the hours as A. M. or P. M., it being understood that all other cities hold rank in the first division of Grade A, that is, morning—A. M. of the first day. In all time notations, then, where no other day is specified, the references are to the first day and where the hour is not distinguished as A. M. or P. M., it should be understood as morning time.

Time scale divisions and terms are employed in the making of this chart for no other purpose than to extend its scope, to increase by more than a hundred-fold the reach of our measure and the numbering capacity of our scale. Marking by minute and hour unit spaces, instead of the linear inch, fractions or multiples thereof, we do what can be done in no other way—show on a small diagram not wider than this page, the precise point at which any city or town, large or small, should be marked, as on a map, to indicate its proportionate size, and its rank among the cities of the world. The graduated time scale as marked on any clock or watch face, is our measuring line, and the minute spaces serve as measuring units, to each of which we allow for a population of 1 m. Just to illustrate and to facilitate comparison

of possibilities of display in the single line extension diagram—the common form for chart representation—and the vastly greater potentiality in the time scheme of measuring with a continuously curved and encircling scale-line, we show a small section of a linear scale marked on the heavy black line stretched across the page underneath the chain of time-piece dials. On this line divisions are shown; first, the unit space, $\frac{1}{8}$ inch; then space equal to a block of ten units, $\frac{5}{8}$ inch. The entire length of line across the page—about six inches—covers over nine of such ten unit spaces, or some 96 units in all, and and if we allow 1 m. population to the unit, the entire line will stand to represent 96 m. That number marked on our time scale would indicate a little more than one and a half times around on the dial—1 h. 36 m., time to show on first dial as 1.36. This, then, is the full marking capacity of the section straight line diagram given here, less than 100 units space, less than 100 m. population. To cover for larger cities we must extend the line according to population; thus, for Washington, D. C., we should need more than 20 inches; for Boston and St. Louis, a little under and a little over 42 inches respectively, or about $3\frac{1}{2}$ feet. These cities are yet well within the limits of Grade A and still mark time on the first dial which covers only the first half-day period. To reach out to and cover the three cities that have passed beyond or outgrown the first day—Grade A—we need more than eight feet of line for Philadelphia, eleven feet for Chicago, and twenty-four feet for New York. Our time scale measuring line extending over the 12 dials, has marking capacity of more than $8\frac{1}{2}$ millions; to be exact, 8640 m. To show this measure on our lineal scale would require extension of that line to just 45 feet. The two forms of chart display thus brought into comparison, the ordinary linear measure with our time scale scheme—one marking to less than 100 m. only, the other to 8640 m.—work practically on the same scale, from the same measuring unit, for the 16th inch unit of linear measure may be taken as identical with the minute space time unit. On either scale, allowing for 1 m. to a unit space, visible marking is possible to show differences down to a single m. population and to 1 m. of time.

Such comparative showing affords most convincing proof, if that

be needed, of the impossibility of satisfactorily displaying on a single chart of linear measurements the size, growth and rank of *all* cities. If we wish to make place on this six inch diagram for New York City, we should have to change our scale and allow for at least 50 m. to a unit space instead of one thousand.

The printed table following names some 200 of the largest cities in the United States strictly in order of size and groups them to show their respective grades, divisions or classes. The time scheme in this chart works automatically, so to speak, to form the grades and divisions as marked on the diagram, the same corresponding to the time periods, day and half day. As most of our cities are in Grade A, first day, and still mark time on the first dial, a further classification and grouping of these seem desirable if not necessary. Such classification must be more or less arbitrary, though divisions are made at numbers in the census scale that are generally regarded as land-marks; thus, the million point attained may mark a city as in the million class.

Then, in like manner, we get the half and the quarter million, the hundred, the sixty and the thirty m. classes.

The population of each city is given in even m.'s or thousands, the same number and designation standing also for the number of minutes covered by the proportionate time marking. Then follows in another column the time notation, the sole object of which is to point out the precise point on the diagram at which the city should be marked—as on a map—to show its measure of growth and its rank. These figures, the record of population and time, are given for 1900 and 1910, with blank spaces provided for 1920.

Note that we make use of National census figures only, disregarding some official state census returns and all of the many so-called estimates put forth from time to time.

Our classification and rating of cities, as shown here, are on the score of population only and not intended as a measure of any city's standing in any other respect.

PRINCIPAL CITIES OF THE UNITED STATES.

All places of 30 m. or over with a few of the largest under 30 m. arranged strictly in order of population in 1910, and grouped to show grades and classes.

Grade D, Fourth Day; Dials 7 and 8.

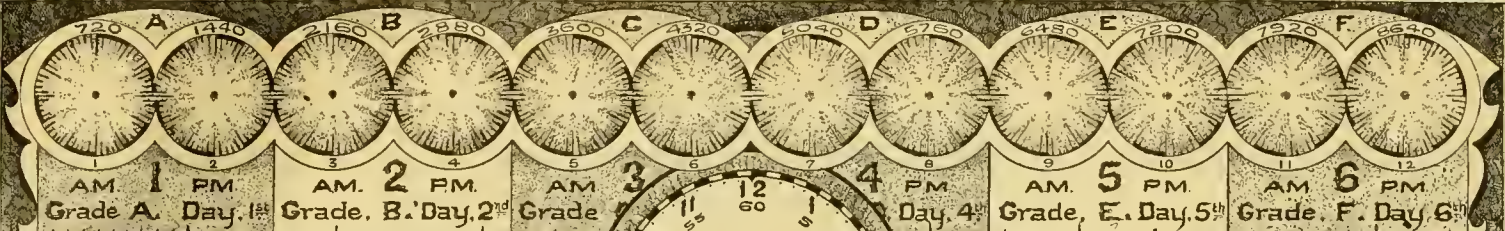
Covering from 4320 m. to 5760 m. 72 hrs. to 96 hrs.

City in Grade D. 1.

	1900			1910			1920		
	m.	Time equiv.	Time	m.	Time equiv.	Time	m.	Time equiv.	Time
New York, N.Y.	3437	2 d. 9 h. 17 m.	9.17 A.M. 3	4767	3 d. 7 h. 27 m.	7.27 A.M. 4			

New York is the only city thus far to hold rank in this grade and no other city is likely to grow into it before 1940, by which time Chicago, if she continues at her previous rate of growth (28.7%) will have the necessary 4320 m. New York should advance to Grade E,

5th day, by 1920, and will do so if she can maintain her previous decade's rate (38.7%); but the State census of 1915 shows a falling away from that percentage, thereby making the matter of the city's advancement to Grade E very uncertain. Watch for the next census returns.



IN this Grade.-A, belong all cities of not more than 1440,000 in population; those not exceeding 720,000, come in the first division and mark their time on the first dial, A.M.-morning, - before noon on the first day.

Of nearly 800 cities in 1910, three, only had, passed the limits of Grade A, wh. stands for 1440 thousands population, and 1440 minutes or minute spaces on the time scale.

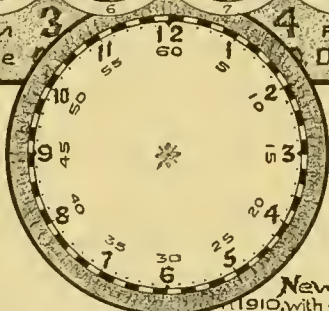
IN this Grade.-B, two cities hold rank under the census of 1910, viz.

Philadelphia, with population, 1,549,000, time measure, 1549 minutes, - 1 day, 1 hour, 49 minutes, or 1.49 AM second day.

Chicago, 2,185,000 population, should show time measurement, 1 day, 12 hours, 25 minutes, or 12.25 PM, second day.

Phila. dia's. Dial No. 3.
Chicago's " " 4.

In 1910 NO CITY IN THE US HAD POPULATION FROM 3500,000 TO 4320,000 THEREFORE NO CITY TO RANK IN THIS GRADE C. 3d DAY.



New York, in 1910, with 4,767,000 marks time on dial No. 7 first division, Grade D 4767 minutes, - 3 days, 7 hours, 27 minutes, or, 7.27 AM, - morning of fourth day.

NO CITY TO RANK IN GRADE E 5th DAY AND MARK TIME ON DIAL 9 OR 10 DURING THIS DECADE 1910-1920.



TIME-SCALE-CHART OR MINUTE MEASURE OF URBAN GROWTH.

WHAT IS CORRECT TIME for this city, - or for any other city? - By this is meant proportionate time only, not actual duration, or lapse of days, hours, or minutes. Simply, then, what is correct **TIME - READING**, - to what points must time-piece hands be advanced to mark time in minutes equal to the number of thousands population. **NOTE**, - that the chart works to group the cities under the various **GRADES, A, B, C, etc.** Each grade covers two divisions, - first and second; the corresponsive time designations, half-day and day periods, covering, respectively, 720 and 1440 minutes. **THE GRADUATED TIME-SCALE** of clock or watch face is our measuring line with the minute space as marked thereon for primary unit of measure. **ALLOWING** arbitrarily, 1000 population to each minute space, we have 60,000 to an hour, 720,000 to each half day, - covered by one dial, - and 1440,000 to a day - two dials, - representing the time-equivalent for one grade **SCALE** of M's. 1 min for 1m pop'n time reading. 0.01am 12.5y

1 hr	60 "	60 "	100 "
1/2 day	12 " 720 "	720 "	1200 noon "
1 "	24 " 1440 "	1440 "	1200 night "

NOTE:- To find correct time reading regard population in even thousands, counting five or more odd 100's as 1000; Thus, **NEW HAVEN** Ct: pop. 134 thousands, time, 134 min = 2 h. 14m - 2 14 **BOSTON, MASS** " 671 " " 671 - = 11 h. 11m = 11 11

Grade B, Second Day ; Dials 3 and 4.

Covering from 1440 m. to 2880 m. 24 to 48 hours.

Cities in Grade B, 2.

	1900			1910			1920		
	m.	Time equiv.	Time	m.	Time equiv.	Time	m.	Time equiv.	Time
Chicago, Ill.	1699	1 d. 4 h. 19 m.	4.19 A.M. 2	2185	1 d. 12 h. 25 m.	12.25 P.M. 2			
Philadelphia, Pa.	1294	21 h. 34 m.	9.34 P.M.	1549	1 d. 1 h. 49 m.	1.49 A.M. 2			

Of the two cities in this grade, Philadelphia in first division marking on Dial 3, Chicago, second division, Dial 4, the latter will need to raise the previous decade's percentage (28.7%) just a few points to insure her ranking in Grade C at next census. Watch for the returns in 1920.

Philadelphia must continue to hold place in first division, B. She can not advance to second division without a little more than doubling her previous rate of 19.8%.

These three are the only cities that have up to this time outgrown Grade A, or the first day time period. No other cities are likely to grow to take rank in Grade B for two or three decades.

St. Louis and Boston are the next two in line, but at their latest previous rate they can not qualify for Grade B before 1960. Cleveland, not quite so near but growing more rapidly, will, if she keeps up her pace (46.8%), come to rank in B in 1940. See the ranking of these cities after the next census.

Grade A, First Day; Dials 1 and 2.
 Covering all not over 1440 m.—24 hours time.

As before explained, the cities in this grade may be separately classified and grouped, arbitrarily, according to population, into six classes, as follows:

MILLION, HALF MILLION, QUARTER MILLION, 100 M., 60 M., 30 M. CLASSES.

MILLION CLASS.

Cities of or over a million, 1000 m., 16 h. 40 m.=4.40 p. m. time.

There are no cities in this class at the present time except, of course, the three that have passed through and beyond it. Cleveland, at her present or recent rate of growth, will take rank in the million class in 1930.

HALF MILLION CLASS.

All of or over 500 m., 8 h. 20 m.=8.20 time, and under 1000 m.=4.40 p. m. time.

Cities in this class.

	1900			1910			1920		
	m.	Time equiv.	Time	m.	Time equiv.	Time	m.	Time equiv.	Time
St. Louis, Mo.....	575	9 h. 35 m.	9.35	686	11 h. 26 m.	11.26			
Boston, Mass.....	561	9 h. 21 m.	9.21	671	11 h. 11 m.	11.11			
Cleveland, O.....	382	6 h. 22 m.	6.22	561	9 h. 21 m.	9.21			
Baltimore, Md.	509	8 h. 29 m.	8.29	558	9 h. 18 m.	9.18			
Pittsburgh, Pa.....	452	7 h. 32 m.	7.32	534	8 h. 54 m.	8.54			

Four or five of the cities now in the quarter million class are practically sure to reach this class by 1920 if they continue at previous rates of increase. Two others will come very near to it.

QUARTER MILLION CLASS.

250 m., 4.10 time to 500 m., 8.20 time.

Cities in this class, 11.

	1900			1910			1920		
	m.	Time equiv.	Time	m.	Time equiv.	Time	m.	Time equiv.	Time
Detroit, Mich.....	286	4 h. 46 m.	4.46	466	7 h. 46 m.	7.46			
Buffalo, N. Y.....	352	5 h. 52 m.	5.52	424	7 h. 04 m.	7.04			
San Francisco, Cal.....	344	5 h. 44 m.	5.44	417	6 h. 57 m.	6.57			
Milwaukee, Wis.....	285	4 h. 45 m.	4.45	374	6 h. 14 m.	6.14			
Cincinnati, O.....	326	5 h. 26 m.	5.26	364	6 h. 04 m.	6.04			
Newark, N. J.....	246	4 h. 06 m.	4.06	347	5 h. 47 m.	5.47			
New Orleans, La.....	287	4 h. 47 m.	4.47	339	5 h. 39 m.	5.39			
Washington, D. C.....	279	4 h. 39 m.	4.39	331	5 h. 31 m.	5.31			
Los Angeles, Cal.....	102	1 h. 42 m.	1.42	319	5 h. 19 m.	5.19			
Minneapolis, Minn.....	203	3 h. 23 m.	3.23	301	5 h. 01 m.	5.01			
Jersey City, N. J.....	206	3 h. 26 m.	3.26	268	4 h. 28 m.	4.28			

At least four of the quarter million cities are sure to take rank in the half million class in 1920. Two would, in fact, be numbered in that class now if the enumeration were made to show it. Los Angeles will undoubtedly qualify for admission to the higher class, passing several cities now ahead of her in line, and to do this she will not need

to maintain her previous exceptionally high rate of increase (211.5%), as an increase of less than 60% over the figures of 1910 will carry over the half million mark. Milwaukee and Newark will come near to that line but neither will reach it without raising the previous rate a few points.

ONE HUNDRED M. CLASS.

100 m., 1.40 time to 250 m., 4.10 time.

Cities in this class, 31.

	1900		1910		1920			1900		1910		1920	
	m.	Time	m.	Time	m.	Time		m.	Time	m.	Time	m.	Time
Kansas City, Mo.....	164	2.44	248	4.08			Birmingham, Ala.....	38	.38	133	2.13		
Seattle, Wash.....	81	1.21	237	3.57			Memphis, Tenn.....	102	1.42	131	2.11		
Indianapolis, Ind.....	169	2.49	234	3.54			Scranton, Pa.....	102	1.42	130	2.10		
Providence, R. I.....	176	2.56	224	3.44			Richmond, Va.....	85	1.25	128	2.08		
Louisville, Ky.....	205	3.25	224	3.44			Paterson, N. J.....	105	1.45	126	2.06		
Rochester, N. Y.....	163	2.43	218	3.38			Omaha, Neb.....	103	1.43	124	2.04		
St. Paul, Minn.....	163	2.43	215	3.35			Fall River, Mass.....	105	1.45	119	1.59		
Denver, Col.....	134	2.14	213	3.33			Dayton, O.....	85	1.25	117	1.57		
Portland, Ore.....	90	1.30	207	3.27			Grand Rapids, Mich.....	88	1.28	113	1.53		
Columbus, O.....	126	2.06	182	3.02			Nashville, Tenn.....	81	1.21	110	1.50		
Toledo, O.....	132	2.12	168	2.48			Lowell, Mass.....	95	1.35	106	1.46		
Atlanta, Ga.....	90	1.30	155	2.35			Cambridge, Mass.....	92	1.32	105	1.45		
Oakland, Cal.....	67	1.07	150	2.30			Spokane, Wash.....	37	.37	104	1.44		
Worcester, Mass.....	118	1.58	146	2.26			Bridgeport, Conn.....	71	1.11	102	1.42		
Syracuse, N. Y.....	108	1.48	137	2.17			Albany, N. Y.....	94	1.34	100	1.40		
New Haven, Conn.....	108	1.48	134	2.14									

Formerly, 100 m. was regarded as high water mark in urban population. New York, that has long stood in a class by itself, ahead of all other cities of the country, was first to come into this class under the fourth decennial census in 1820 with 124 m. Not until 1840, sixth census, did any other cities attain to rank in the 100 m. class. In that year, two, Baltimore and New Orleans, came each with 102 m., just the population of Bridgeport, Conn., in 1910. Philadelphia perhaps might be regarded as a 100 m. city at that time though it was credited with only 94 m., but the county of Philadelphia, which the city was afterwards extended to include, had then 258 m. In 1860 and during the decade covering the Civil War, there were only nine cities ranked in or beyond the 100 m. class, in the following order: *New York*, 814 m. and *Philadelphia*, 566 m., both in the half million class; *Brooklyn*, with 267 m., in the quarter million class; *Baltimore*, with 212 m.; *Boston*, 178 m.; *New Orleans*, 169 m.; *Cincinnati* and *St. Louis*, each 161 m., and *Chicago*, 112 m.

Since 1860 the number of cities in or above the 100 m. class has steadily increased. In 1910, thirteenth census, 14 were added, making 50 in all during this decade and, assuming that they will continue their respective rates of increase, no less than 26 are practically certain to take rank in this class in 1920. Of the nine cities named above, Brooklyn has since become part of New York, so the list represents only eight of the cities of to-day.

Two cities, Providence and Louisville, show here as equals in respect to population and time, 224 m., 3.44 time. Providence takes rank before Louisville, however, when numbers below fourth place are considered; thus, the population of Providence, 224,326, is 398 more than Louisville's 223,928. The minus sign after the latter's records shows that the actual population of the city is a little under the indicated number of thousands instead of equal to or something less than 500 in excess of it.

60 M. CLASS.

60 m., 1.00 time to 100 m., 1.40 time.

Cities in this class, 39.

	1900		1910		1920			1900		1910		1920	
	m.	Time	m.	Time	m.	Time		m.	Time	m.	Time	m.	Time
Hartford, Conn.....	80	1.20	99—	1.39—			Somerville, Mass.....	62	1.02	77	1.17		
Trenton, N. J.....	73	1.13	97—	1.37—			Troy, N. Y.....	61	1.01	77—	1.17—		
New Bedford, Mass.....	62	1.02	97—	1.37—			Utica, N. Y.....	56	0.56	74	1.14		
San Antonio, Texas.....	53	0.53	97—	1.37—			Elizabeth, N. J.....	52	0.52	73	1.13		
Reading, Pa.....	29	1.19	96	1.36			Fort Worth, Texas.....	27	0.27	73	1.13		
Camden, N. J.....	76	1.16	95—	1.35—			Waterbury, Conn.....	46	0.46	73	1.13		
Salt Lake City, Utah.....	54	0.54	93—	1.33—			Schenectady, N. Y.....	32	0.32	73—	1.13—		
Dallas, Texas.....	43	0.43	92	1.32			Hoboken, N. J.....	59	0.59	70	1.10		
Lynn, Mass.....	59	1.09	89	1.29			Manchester, N. H.....	57	0.57	70	1.10		
Springfield, Mass.....	62	1.02	89—	1.29—			Evansville, Ind.....	59	0.59	70—	1.10—		
Wilmington, Del.....	77	1.17	87	1.27			Akron, O.....	43	0.43	69	1.09		
Des Moines, Ia.....	62	1.02	86	1.26			Norfolk, Va.....	46	0.46	67	1.07		
Lawrence, Mass.....	63	1.03	86—	1.26—			Wilkesbarre, Pa.....	52	0.52	67	1.07		
Tacoma, Wash.....	38	0.38	84—	1.24—			Peoria, Ill.....	56	0.56	67—	1.07—		
Kansas City, Kan.....	51	0.51	82	1.22			Erie, Pa.....	53	0.53	67—	1.07—		
Yonkers, N. Y.....	48	0.48	80—	1.20—			Savannah, Ga.....	54	0.54	65	1.05		
Youngstown, O.....	45	0.45	79	1.19			Oklahoma City, Ok.....	32	0.32	64	1.04		
Houston, Texas.....	45	0.45	79—	1.19—			Harrisburg, Pa.....	50	0.50	64	1.04		
Duluth, Minn.....	53	0.53	78	1.18			Fort Wayne, Ind.....	45	0.45	61—	1.01—		
St. Joseph, Mo.....	103	1.43	77	1.17									

Note several instances here where two or more cities seem to be on an equality as to number and time reading; as Trenton, New Bedford and San Antonio, each showing 97 m., 1.37 time. In all such cases the cities take place in line according to their odd numbers, in excess of even thousands; thus the exact figures for the three cities named are: *Trenton*, 96,815; *New Bedford*, 96,652, and *San Antonio*, 96,614, the last two named showing as equals down to hundreds, differing only in tens and units. One city in this class shows a loss, dropping from 103 m. to 77 m.,

1.43 time, to 1.17. Note the loss of 26 m. in population and 26 m. in time for St. Joseph, Mo. The minus sign after a city's record (1910) shows the city was then just a little under the number of even m.'s credited to it. As before stated, some 25, perhaps more, of these 39 cities will take place in the 100 m. class at next rating. A number of them have indeed really belonged to that class for some years.

30 M. CLASS.

30 m., 0.30 time to 59 m., 0.59 time.

Cities in this class, 98.

	1900	1910	1920		1900	1910	1920		1900	1910	1920
	m.	m.	m.		m.	m.	m.		m.	m.	m.
Charleston, S. C.	0.56	0.59		Haverhill, Mass.	0.37	0.41		Lexington, Ky.	0.26	0.35	
Portland, Me.	0.50	0.59		Lincoln, Neb.	0.40	0.44		Roanoke, Va.	0.21	0.35	
E. St. Louis, Ill.	0.30	0.59		New Britain, Conn.	0.26	0.44		Joliet, Ill.	0.29	0.35	
Terre Haute, Ind.	0.37	0.58		Salem, Mass.	0.36	0.44		Auburn, N. Y.	0.30	0.35	
Holyoke, Mass.	0.46	0.58		Topeka, Kan.	0.34	0.44		East Orange, N. J.	0.22	0.34	
Jacksonville, Fla.	0.28	0.58		Davenport, Ia.	0.35	0.43		Taunton, Mass.	0.31	0.34	
Brockton, Mass.	0.40	0.57		McKeesport, Pa.	0.34	0.43		Charlotte, N. C.	0.18	0.34	
Bayonne, N. J.	0.33	0.56		Wheeling, W. Va.	0.39	0.42		Everett, Mass.	0.24	0.33	
Johnstown, Pa.	0.36	0.55		Augusta, Ga.	0.39	0.41		Portsmouth, Va.	0.17	0.33	
Passaic, N. J.	0.28	0.55		Macon, Ga.	0.23	0.41		Oshkosh, Wis.	0.28	0.33	
S. Bend, Ind.	0.36	0.54		Berkeley, Cal.	0.13	0.40		Cedar Rapids, Ia.	0.26	0.33	
Covington, Ky.	0.43	0.53		Superior, Wis.	0.31	0.40		Quincy, Mass.	0.24	0.33	
Wichita, Kan.	0.25	0.52		Newton, Mass.	0.34	0.40		Chelsea, Mass.	0.34	0.32	
Altoona, Pa.	0.39	0.52		San Diego, Cal.	0.18	0.40		Perth Amboy, N. J.	0.18	0.32	
Allentown, Pa.	0.35	0.52		Kalamazoo, Mich.	0.24	0.39		Pittsfield, Mass.	0.22	0.32	
Springfield, Ill.	0.34	0.52		El Paso, Texas.	0.16	0.39		Joplin, Mo.	0.26	0.32	
Pawtucket, R. I.	0.38	0.52		Butte, Mont.	0.30	0.39		Williamsport, Pa.	0.29	0.32	
Mobile, Ala.	0.38	0.52		Flint, Mich.	0.13	0.39		Jackson, Mich.	0.25	0.31	
Saginaw, Mich.	0.42	0.51		Chester, Pa.	0.34	0.39		Jamestown, N. Y.	0.23	0.31	
Canton, O.	0.31	0.50		Dubuque, Ia.	0.36	0.38		Amsterdam, N. Y.	0.21	0.31	
Binghamton, N. Y.	0.40	0.48		Montgomery, Ala.	0.30	0.38		Lansing, Mich.	0.16	0.31	
St. Louis City, Ia.	0.33	0.48		Woonsocket, R. I.	0.28	0.38		Huntington, W. Va.	0.12	0.31	
Lancaster, Pa.	0.41	0.47		Racine, Wis.	0.29	0.38		Decatur, Ill.	0.21	0.31	
Springfield, O.	0.33	0.47		Fitchburg, Mass.	0.32	0.38		Mt. Vernon, N. Y.	0.21	0.31	
Atlantic City, N. J.	0.23	0.46		Tampa, Fla.	0.16	0.38		Lima, O.	0.22	0.31	
Little Rock, Ark.	0.38	0.46		Quincy, Ill.	0.36	0.37		Niagara Falls, N. Y.	0.19	0.30	
Rockford, Ill.	0.31	0.45		Elmira, N. Y.	0.35	0.37		La Crosse, Wis.	0.29	0.30	
Bay City, Mich.	0.28	0.45		Galveston, Texas.	0.38	0.37		Newport, Ky.	0.28	0.30	
York, Pa.	0.34	0.45		Knoxville, Tenn.	0.33	0.36		Pasadena, Cal.	0.09	0.30	
Sacramento, Cal.	0.29	0.45		New Castle, Pa.	0.28	0.36		Austin, Texas.	0.22	0.30	
Chattanooga, Tenn.	0.30	0.45		W. Hoboken, N. J.	0.23	0.35		Aurora, Ill.	0.24	0.30	
Malden, Mass.	0.34	0.44		Hamilton, O.	0.24	0.35		Orange, N. J.	0.21	0.30	
Pueblo, Col.	0.28	0.44		Springfield, Mo.	0.23	0.35					

As we come down the scale we find among the smaller cities an ever-increasing number each holding rank with one or more others on the score of thousands population and minutes time; thus, marking in 1910 at 59 m., we have three; at 45 m., five; at 38 m., six; at 32 m. and 31 m., each seven. These are given rank and place in the list according to numbers below thousands, hundreds, tens, and sometimes even units are considered.

Here are Lincoln, Neb., and New Britain, Conn., cities of 44 m. each, numbering 43,973 and 43,916 respectively, the former exceeding the latter by 57. While Lincoln thus outranks New Britain for the time, she cannot be expected to hold the ranking place long for her rate per cent. of increase in the decade up to 1910 was only 9.5, while New Britain came bounding to her place at the rate of 68.9 per cent.

Springfield, Ill., and Pawtucket, R. I., are 52 m. cities in our table, and are on a parity also in the number of hundreds, showing difference only in tens and units. Springfield's population, 51,678, is 55 more than Pawtucket's 51,522, and gives her ranking place. Springfield's percentage of increase, 51.3, is also greater than Pawtucket's 31.5.

Austin, Texas and Aurora, Ill., close neighbors in alphabetic arrangement, appear here in alphabetic order reversed. Both are 30 m. cities; Austin, 29,850, and Aurora 29,807, a difference of 53 in favor of Austin, whose percentage of growth is to that of Aurora as 34.1 to 23.5.

Jamestown and Amsterdam are two cities of New York each 31 m. and on a parity, too, in hundreds. Jamestown has 31,297 and Amsterdam 31,267—just 30 less. Amsterdam excels in rate of growth, 49.4 against Jamestown's 36.7.

Niagara Falls, N. Y., and La Crosse, Wis., two cities ranking 30 m., number respectively 30,445 and 30,417—difference of 28 in favor of the first named, which

place also has the advantage of greater per cent. increase, 55.5 against 5.3 for La Crosse.

So we find two 31 m. cities, Huntington, W. Va., 31,161, and Decatur, Ill., 31,140, with a difference of only 21. While the first named holds rank to that extent she also excels in growth percentage, 161.4 against even 50 per cent. for Decatur.

Salem, Mass., and Topeka, Kans., are somewhat closer contestants, both cities of 44 m. (435 hundreds), numbering respectively 43,597 and 43,684. Salem with 97 odd units, only 13 ahead of Topeka's 84. Topeka leads a few points in rate of growth, however—30 per cent., as against 21.5 for Salem.

Flint, Mich., and Chester, Pa., each 39 m., are two other cities with a difference of only 13 in actual numbers, the first named, 38,550, the other, 38,537—but Flint, in the matter of growth per cent., outranks Chester in a greater degree, 194.2 per cent. to 13.4.

Closer contestants than those mentioned we find in Joliet, Ill., and Auburn, N. Y., 35 m. cities, numbering respectively 34,570 and 34,668, a difference of only 2 in favor of Joliet, whose ranking by this slender margin is not strengthened very much by a slight excess in rate over Auburn's rate. Joliet's increase was at 18.1 per cent.; Auburn's, 14.2.

But it remains for Pittsfield, Mass., and Perth Amboy, N. J., to strike the nearest line of equality—carrying it down to the last analysis in units. These two cities show the same in actual numbers—32,121. We must give ranking place to Perth Amboy simply because of her more rapid growth—81.5, compared with 47.6 for Pittsfield.

Singularly enough, these two cities also come together in the alphabetical arrangement, and in our placing according to numbers and percentages, we do not need to change the order at all.

SIXTEEN LARGEST UNDER 30 M.

	1900	1910	1920		1900	1910	1920		1900	1910	1920
	m.	m.	m.		m.	m.	m.		m.	m.	m.
Council Bluffs, Ia.....	0.26	0.29		Poughkeepsie, N. Y.....	0.24	0.28—		Brookline, Mass.....	0.20	0.28—	
Colorado Springs, Col.....	0.21	0.29		Norristown, Pa.....	0.22	0.28—		Meriden, Conn.....	0.24	0.27	
San Jose, Cal.....	0.22	0.29—		Danville, Ill.....	0.15	0.28—		Newport, R. I.....	0.22	0.27	
New Rochelle, N. Y.....	0.15	0.29—		Waltham, Mass.....	0.23	0.28—		Watertown, N. Y.....	0.22	0.27—	
Easton, Pa.....	0.25	0.29—		Newburgh, N. Y.....	0.25	0.28—		Waterloo, Ia.....	0.13	0.27—	
Shreveport, Ia.....	0.16	0.28									

This special group of sixteen cities is added here for complementary purposes only. It serves to make our several lists complete to show as one grand total covering 200 of the largest cities of this country exclusive of the three higher grade cities, New York, Chicago and Philadelphia, which have been shown as distinctly classed by themselves, no others as yet having passed beyond the limits of Grade A, but all still marking time within the first division of that grade on

the first dial which covers only one half day period on our time scale. Thus we have in the foregoing lists a total showing of 203 cities in order of size, as follows:

In higher grades, 3 in Grade A (five classes): The half million class, 6; quarter million, 11; 100 m., 31; 50 m., 39; 30 m., 98; together with all cities which in 1910 numbered 27 or 28 or 29 m., 16; making the total number over 26 m., 203.

The following nine cities are in states not represented in the classified lists. They are given here, not as ranking among the largest cities of the country, but each to stand as the largest in the state of which it is a part.

While noting the gains of Albuquerque, Reno, and Boise, from near or over 200 to a little less than 300%, you will not fail to observe Cheyenne's loss of near 20%,

growing downward from 14 m. in 1900 to 11 m. in 1910. This seems the more remarkable when we consider the fact, that while Cheyenne, the only city in the state conspicuous enough to appear in most census tables, and one of only four that figure in any reports as over 5 m., lost at the rate of near 20%, the state gained 57.7%.

	1900	1910	1920		1900	1910	1920		1900	1910	1920
	m.	m.	m.		m.	m.	m.		m.	m.	m.
Meridian, Miss.....	14	23		Fargo, N. D.....	10	14		Cheyenne, Wyo.....	14	11	
Burlington, Vt.....	19	20		Sioux Falls, S. D.....	10	14		Albuquerque, N. M.....	6	11	
Boise, Idaho.....	6	17		Tucson, Ariz.....	8	13		Reno, Nev.....	5	11—	

We do not need to confine our recreation studies to city populations alone for, without adding a line to our diagram, without changing our scale in any particular or modifying in the least the plan for its operation, we may proceed in exactly the same way to measure, compare, and display in order of degree, the growth and rank of any or all of the states in the union or countries of the world. It may be thought that the twelve-dial diagram, providing as it does for visible marking to cover more than eight and a half million unit spaces and to register that number of thousands population or corresponding minutes time, will fall short when we come to apply it to display vastly greater numbers or proportions, and that it will then be necessary to extend the figure by adding other clock faces. But not so, we do not need additional dials. As a matter of fact, not all of the twelve used here are really essential for the measuring we have done nor for what we propose to do, as a single dial figure with the printed record in the table following it can be made to answer every purpose. More than that, even the single dial for a diagram is not really needed in this or any such publication, for every man with a time-piece in his pocket has such diagram always at hand.

In this we may see one of the many and peculiar advantages of the time-scale scheme for measuring and the use of time-table terms for recording. The simple

table printed in such terms without illustrative diagram of any kind, constitutes a chart that needs no illustrating. This can be said of no other form of chart construction. If, for example, we simply note here the time reading of any number of cities, as Trenton, 1.37; New Haven, 2.14; St. Paul, 3.25; Kansas City, Mo., 4.08; Newark, 5.47; St. Louis, 11.26 (all first day of course); Chicago, 12.25 p. m., second day; these time records alone indicate most clearly and accurately the exact relative proportions of and differences between any of the places named. Such a chart may almost be said to be one that the blind can see, for a blind person on *hearing* the record will get as clear an idea of relative positions and proportionate differences as can be carried through the eye to the mind of one who can see. The exact measure of differences between 1.37 (Trenton), 11.26 (St. Louis, both a. m., say on the first day), and 12.25 p. m., on the second day (Chicago), cannot be impressed upon anyone's mind more clearly by visible marking in diagram or picture, than by the simple printed record.

In the following table, we show the time reading of each of our 48 states under the census of 1910, naming the states in order of size. From these time records the population of any state can easily be told, reckoning 1440 m. a day, 60 m. an hour, 1 m. a minute. (See page 15.)

In the foregoing tables many cities appear, each grouped with certain others so nearly the same in population and rank as to attract attention and lead people directly interested in those places to see how they come out at the next census reporting. Most of this grouping shows in the tables below the hundred thousand class, but we find a few cases of near equality among the larger cities as well—thus, New Haven, Conn., and Birmingham, Ala., register respectively, in 1910, 134 m. and 133 m.; 2.14 and 2.13 time marking, differences of only a thousand in population and a minute in time record. We see further, however, that New Haven's rate per cent. of increase during the previous decade was 23.7, while Birmingham grew at the abnormal rate of 245.4 per cent. Supposing them to continue the same rates of increase through this decade, it is easy to figure how far Birmingham will appear ahead of New Haven in 1920.

Two other cities showed in 1910 under conditions that invited comparison but which must soon, or even now, be regarded in contrast. Bridgeport, Conn., and Albany, N. Y., both came at that time into the 100 m. class. The former with 102 m., time 1.42; the latter with just 100 m., time 1.40. But Bridgeport's rate of growth was then reported as 43.7 per cent. and Albany was credited with only 6.5 per cent. While noting these conditions affecting the two cities it is interesting to note further that far-away Spokane, Washington, is shown here at 104 m.,

1.44 time, only 2 m. in advance of the Connecticut city. Report shows Spokane as growing at the rate of 183.3 per cent., which, if continued, and allowing for Bridgeport to continue at her old rate, would soon put Spokane far in the lead. This will be an interesting race to watch, for Bridgeport has struck a booming pace and is growing faster than ever. A year ago she had, as it were, her "seven league boots" on and was making ready for rapid and long strides ahead. She then set as a high mark in population to be reached before the end of 1916, 200 m. If she attains to that this year and goes on at anything like the same pace the census of 1920 will certainly put her in the quarter million class.

In classes under 100 m. we find more cities in groups, all of a group showing the same in even thousands and the same time markings. Thus, at 97 m., 1.37 time, we have three at 89 m., 1.29 time; two at 86 m., 1.26 time; two at 79 m., 1.19 time; two at 77 m., 1.17 time; two at 73 m., 1.13 time; four at 70 m., 1.10 time; four at 64 m., 1.04 time; three, and so on down the scale, we find more than 130 cities in groups, so to speak—groups of two or three to groups of seven and eight.

People of these cities will be interested to watching the next and succeeding census returns to see how the relations of their respective cities are changed or what new and different relations are established.

CHART EXTENSION.

We may apply our time-scale measurements to other cities, towns or villages, even down to places of not more than 1 m. population, or we may use the chart in like manner to measure and display any or all cities of the world, as its measuring capacity is unlimited.

To illustrate, we give here the time readings for various cities outside our own country. According to latest census reports or official estimates as given in the World Almanac, 1916, we gather the following for sixteen largest cities of

the earth, including three or four of our own. Comparisons altogether intelligent and accurate, however, cannot well be made from this table owing to the fact that the census reports or official estimates were made for different years. Here we deviate from the rule consistently followed thus far, and in this table of later census returns and estimates, put our own cities—the three that come into this grouping, New York, Chicago and Philadelphia, on a similar footing, rather than on the basis of 1910

London	1911	7253 m.	0.53 A.M.	sixth day	Philadelphia	1914	1658 m.	3.38 A.M.	second day
New York	1915	5254 m.	3.34 P.M.	fourth day	Moscow	1912	1618 m.	2.58 "	" "
Paris	1911	2888 m.	0.08 A.M.	third day	Buenos Ayres	1914	1560 m.	2.00 "	" "
Chicago	1914	2393 m.	3.53 P.M.	second day	Constantinople	1914	1300 m.	9.40 P.M.	first day
Berlin	1910	2071 m.	10.31 A.M.	" "	Warsaw	1915	1250 m.	8.50 "	" "
Tokio	1914	2033 m.	9.53 "	" "	Osaka	1912	1227 m.	8.27 "	" "
Vienna	1910	2031 m.	9.51 "	" "	Calcutta	1911	1222 m.	8.22 "	" "
Petrograd	1912	2019 m.	9.39 "	" "	Rio de Janeiro	1911	1129 m.	6.49 "	" "

Of these sixteen cities, all that have passed the million mark in population, eleven may be ranked with what we may term higher grade cities, having passed the bounds of Grade A, 1440 m., in population, one day on the time scale. One, London, holds place to Grade F, sixth day—first, or morning division, marking on Dial 11; another, New York, in Grade D, fourth day, time P.M., shown on Dial 8; one, Paris, in C, third day, A.M., Dial 5; and eight take rank in Grade B, second day; one, Chicago, in second division of that grade, marking time P.M. on Dial 4, and seven in first division, A.M. time, Dial 3. The remaining five of these sixteen cities cluster around and mark time on Dial 2, which covers time P.M. in 2d division, Grade A, first day.

We see in this distribution of cities on our map or diagram, a likeness, not obscure or far-fetched, to the planetary units of the solar system in respect to the extent of radius, or distance from the common center—the sun. The suggestion is easy and natural to let London, New York, Paris and Chicago stand respectively for Neptune, Uranus, Saturn, and Jupiter; Berlin may (very appropriately) answer for Mars, while six other cities clustering about Dial 3, with the five still marking time of first day on Dial 2, may cover to represent Earth, and the smaller planets back to the central source, first division, Grade A, through and away from which all originally grew.

POPULATION TIME-TABLE OF STATES.

1910	Time	Grade	Dial	
New York.....	7.54 A.M., 7th day	G	13	Dial 13 not covered by diagram.
Pennsylvania.....	7.27 " 6th "	F	11	
Illinois.....	9.59 P.M., 4th "	D	8	
Ohio.....	7.27 A.M., 4th "	D	7	Compare New York City
Texas.....	4.57 P.M., 3d "	C	6	
Massachusetts.....	8.06 A.M., 3d "	C	5	
Missouri.....	6.53 A.M., 3d "	C	5	
Michigan.....	10.50 P.M., 2d "	B	4	
Indiana.....	9.01 " 2d "	B	4	
Georgia.....	7.29 " 2d "	B	4	
New Jersey.....	6.17 " 2d "	B	4	
California.....	3.38 " 2d "	B	4	
Wisconsin.....	2.54 " 2d "	B	4	
Kentucky.....	2.10 " 2d "	B	4	
Iowa.....	1.05 " 2d "	B	4	
North Carolina.....	12.46 " 2d "	B	4	See Chicago
Tennessee.....	12.25 " 2d "	B	4	
Alabama.....	11.25 A.M., 2d "	B	3	
Minnesota.....	10.36 " 2d "	B	3	
Virginia.....	10.22 " 2d "	B	3	
Mississippi.....	5.27 " 2d "	B	3	
Kansas.....	4.11 " 2d "	B	3	See Philadelphia
Oklahoma.....	3.37 " 2d "	B	3	
Louisiana.....	3.36 " 2d "	B	3	
Arkansas.....	2.14 " 2d "	B	3	See New Haven—difference, 24 h.
South Carolina.....	1.15 " 2d "	B	3	
Maryland.....	9.35 P.M., 1st "	A	2	
West Virginia.....	10.21 " 1st "	A	2	
Nebraska.....	7.52 " 1st "	A	2	
Washington.....	7.02 " 1st "	A	2	
Connecticut.....	6.35 " 1st "	A	2	
Colorado.....	1.19 " 1st "	A	2	
Florida.....	12.33 " 1st "	A	2	
Maine.....	12.22 " 1st "	A	2	See Boston-St. Louis
Oregon.....	11.13 A.M., 1st "	A	1	
South Dakota.....	9.43 " 1st "	A	1	
North Dakota.....	9.27 " 1st "	A	1	See Cleveland
Rhode Island.....	9.03 " 1st "	A	1	See Baltimore-Pittsburgh
New Hampshire.....	7.11 " 1st "	A	1	See Buffalo
Montana.....	6.16 " 1st "	A	1	See Milwaukee
Utah.....	6.13 " 1st "	A	1	See Milwaukee
Vermont.....	5.56 " 1st "	A	1	See Cincinnati-Newark
New Mexico.....	5.27 " 1st "	A	1	See Washington, D. C.
Idaho.....	5.26 " 1st "	A	1	See Washington, D. C.
Arizona.....	3.24 " 1st "	A	1	See St. Paul
Delaware.....	3.23 " 1st "	A	1	See Portland, Oregon
Wyoming.....	2.25 " 1st "	A	1	See Worcester
Nevada.....	1.22 " 1st "	A	1	See Tacoma; Kansas City, Kan.; Yonkers

Against the names of certain states appear the names of cities of approximately the same population. It is interesting to note that New York City outnumbers every state in the union except two—Pennsylvania and Illinois—two only, unless we make exception also for Ohio, which state shows for 1910 population and time records exactly the same as the city of New York, 4767 m., 3 d. 7 h. 27 m.; time, 7.27 a.m., fourth day. This equality comes through reckoning in even thousands. When we come to take account of odd numbers under thousands we find a slight difference—238, in favor of Ohio. This slender lead, while it may suffice to give the state a ranking over the city for that time, could not hold for long, as New York City was then growing at the rate of 38.7%, while Ohio's rate of increase was only 14.7%.

Another case of near equality we find between the city of Chicago and the state of Tennessee, each appearing here marked at 2185 m., 12.25 p.m., second day, while the reckoning of the odd hundreds shows a difference of 494 in favor of Chicago.

To mark New York State's time on a chart like ours, we should have to extend the diagram a little and find a place for the Empire State on Dial 13—first division of Grade G. Pennsylvania finds place on Dial 11, the first in Grade F, the highest grade outlined here, Illinois on Dial 8, Grade D, and Ohio on Dial 7, same grade, right along with New York City. Texas, sometimes called the "Lone Star" state, holds place by herself on Dial 6, on which also she may be classed as a lone star, while two states, Massachusetts and Missouri, take rank together in the first half of Grade C, 3d day, Dial 5. Dials 4 and 3, both in Grade B, second day, give respectively time marking spaces for 10 and 9 cities, while 8 point out their time on Dial 2, leaving 14 to crowd in, as it were, on Dial 1, where nearly all of our cities—all but three in 1910—mark time.

The next move forward with our measuring line leads to considering our country as a whole and showing it in comparison with any or with all other nations of the world. This too may be done without changing at all the form or dimensions of our diagram or adopting any other scale of measurement.

In 1910, this country, continental United States—48 States, and the District of Columbia, reported 91,716 m. population—proportionate time measure, 63 d. 20 h. 52 m.; i. e., 8.52 p. m., 64th day. If now we count this time stretch as beginning with March 1, any year, choosing March instead of January for reasons that are

obvious, these 63 days will extend to and include the second of May following, and United States time registers as 8.52 p. m., May 3 (64th day). This, it may be interesting to note in passing, was when New York, the most populous of the states and New York largest of the cities, were marking time, one at 7.54 a. m., March 7th, the other, 7.27 a. m., March 4—and fifteen of the smaller states were yet in the forenoon of March 1.

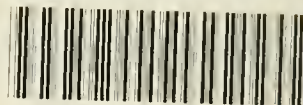
Having thus compassed all the cities of the world, measured accurately the states in the Union, and fixed definitely the point to which our country as a whole should cover on the scale of proportionate time, we may reach out at will to any and all nations other than our own to determine for each its ranking place on the map of comparative values, as, for example, our near neighbor, little Cuba with her 2100 m. population, at 11.00 a. m., March 2; Denmark, 2800 m., 10.40 p. m., March 2; Greece, 3000 m., 2.00 a. m., March 3; Belgium, 7500 m., 5.00 a. m., March 6; Mexico, 15,000 m., 10.00 a. m., March 11; Italy, 35,000 m., 7.20 a. m., March 25; France, 39,600 m., 12 noon, March 28; United Kingdom (Great Britain and Ireland), 45,222 m., 9.42 a. m., April 1; Austro-Hungary, 49,900 m., 3.40 p. m., April 4; Japan, 52,200 m., 6.00 a. m., April 6; Germany, 66,715 m., 7.55 a. m., April 16; Russia, 171,000 m., 118 d. 18 h. 00 m., 6.00 p. m., June 27; then to far away India with her 315,156 m., 8.36 p. m., October 5; to thickly populated China with 400,000 m., 6.40 p. m., December 3; and finally to the British Empire as a whole with 437,947 m., 3.07 a. m., December 30.

This completes our circuit of the world, applying the time scale to the measurement of populations of every class, city, state and national.

It is the use of the time scale for measuring and time-table terms for recording that makes it possible thus to bring the whole world of cities, states, and countries to the one gradation—one measuring scheme of comparative rank or order.

In no other form of chart representation can anything like this be done. To locate our own country in its place in the ordinary straight line scale of proportionate linear measure, using the same space unit employed in this encircling line, practically as we have shown it, 1-16 inch to a thousand population, would require not less than 500 feet of scale line, while to reach out to cover the British Empire would take more than 2200 feet; nearly half a mile.

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